## Death Certificate Data from the National Center for Health Statistics (NCHS)

- From 50 states and District of Columbia
- Underlying cause of each death
- Preliminary data for 1998 and final data for earlier years
- NCHS mortality Internet web site: http://www.cdc.gov/nchs/about/major/dvs/mortdata.htm

Analyses of Trends in Rates of Death due to HIV Infection

- Comparison of HIV Infection with Other Causes of Death
- Comparison of HIV Death Rates among Demographic Groups
- Changes in the Demographic Distribution of HIV Deaths



#### Death Certificate Data from the National Center for Health Statistics NCHS

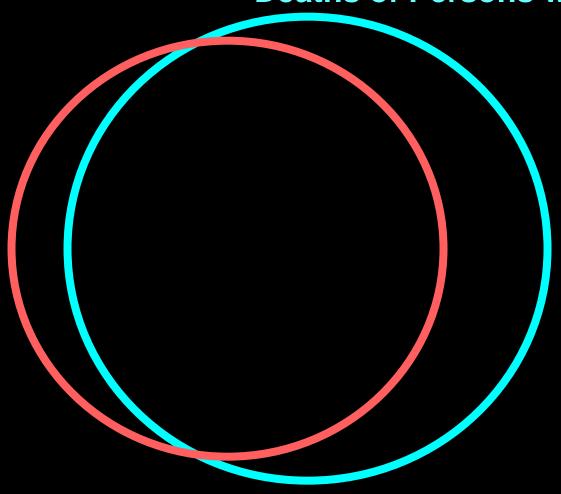
The following slides are based on data compiled by CDC's National Center for Health Statistics (NCHS) from death certificates of U.S. residents in the 50 states and the District of Columbia. NCHS determines the underlying cause of each death based on the causes of death reported on death certificates by physicians, medical examiners, and coroners. Some of the analyses presented in these slides use preliminary data for 1998 and others use only final data through 1997, which are more detailed. Additional information on the nature and sources of cause-of-death data from death certificates may be found at the NCHS mortality web site address shown here. These data are the sole source of information on all causes of death in the national population, providing the unique advantage of allowing the rate of death from human immunodeficiency virus (HIV) infection to be compared with rates of death from other causes. They also include demographic information, allowing comparison of different age, sex, and racial groups, but they do not include information on modes of exposure to HIV.



### **Deaths Due to HIV Infection**

are not exactly the same as

Deaths of Persons with AIDS





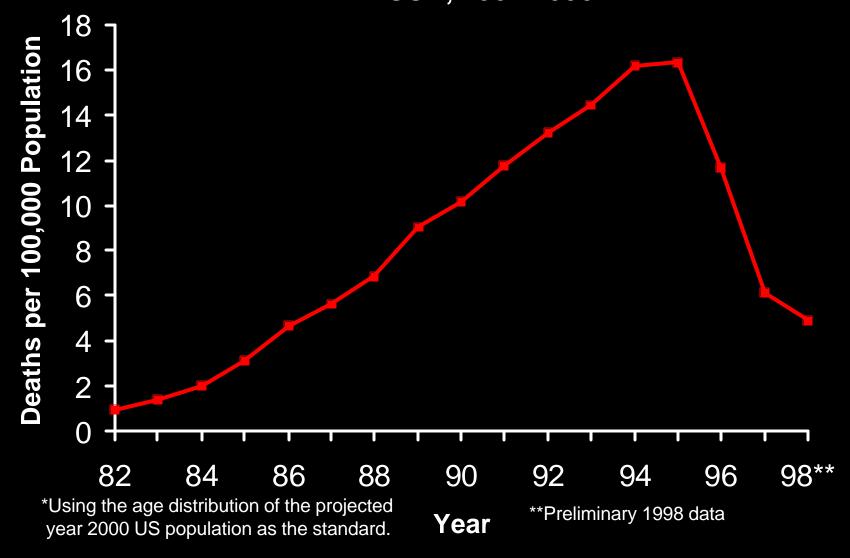
### Deaths Due to HIV Infection are not exactly the same as Deaths of Persons with AIDS

Deaths due to HIV infection, as reported on death certificates, (represented by the red circle on the left) are not exactly the same as deaths of persons with AIDS reported to AIDS surveillance systems of health departments (represented by the blue circle on the right). The crescent shape on the right side of this diagram includes the small percentage of persons with AIDS who die from causes unrelated to HIV infection (such as myocardial infarction, lung cancer, or motor vehicle accidents). Because of improved treatment, survival after diagnosis of AIDS has become longer, which may allow a greater percentage of persons with AIDS to die from other causes. In addition, this crescent includes some persons who die from HIV infection that is falsely not reported as the underlying cause of death on the death certificate.

The crescent shape on the left side of this diagram represents the small percentage of persons who do not meet the surveillance criteria for having AIDS among all the persons whose death certificates say they died from HIV infection. The AIDS case definition requires information documenting a low CD4 T-lymphocyte count or diagnosis of one of the 27 AIDS-defining illnesses.



### Trends in Age-Adjusted\* Rates of Death due to HIV Infection, USA, 1982-1998





#### Trends in Age-Adjusted Rates of Death due to HIV Infection, USA, 1982-1998

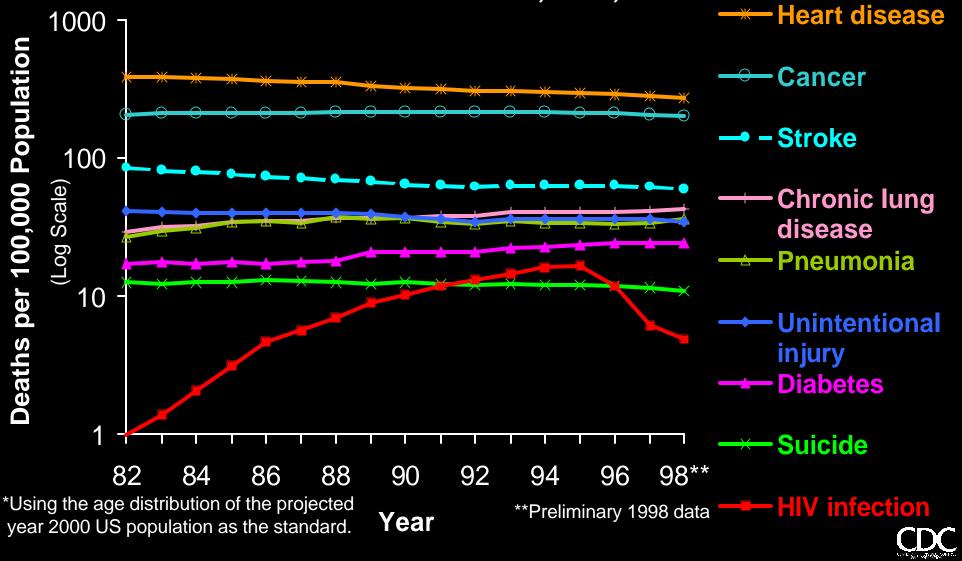
The trends in the age-adjusted rate of death due to HIV infection show an almost linearly increasing rate from 1984 through 1994, and a sharply decreasing rate after the maximum of about 16 deaths per 100,000 population in 1995. The rate in 1998, about 5 deaths per 100,000 population, was lower than the rate in 1987. The rate of decrease slowed, however, between 1997 and 1998. The age-adjusted HIV death rate decreased 29% in 1996, 48% in 1997, and about 21% in 1998.

The decrease in the rate after 1995 was probably mainly due to improved antiretroviral therapy. Prophylactic medications against opportunistic infections and the prevention of HIV infection may also have played roles in this decrease.

To eliminate the effect on the death rate of changes in the age distribution of the population, the rates shown here have been adjusted to appear as though the population in every year had the same age distribution as that projected for the population in the year 2000, which will become the Public Health Service's official standard for age-adjustment beginning with the 1999 data year.



### Trends in Age-Adjusted\* Rates of Death due to the 8 Leading Causes of Death and HIV Infection, USA, 1982-1998



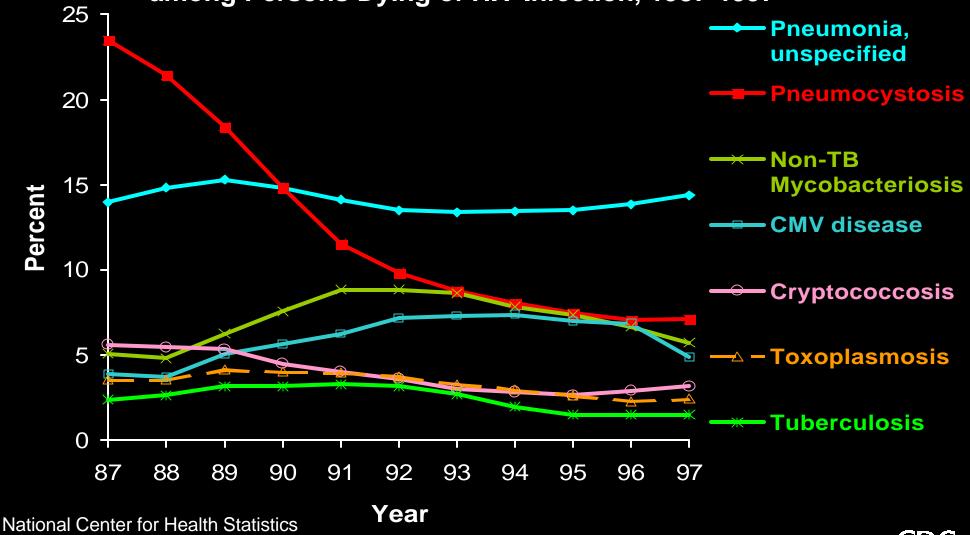
### Trends in Age-Adjusted Rates of Death due to the 8 Leading Causes of Death and HIV Infection, USA, 1982-1998

The red curve representing HIV infection at the bottom of this slide uses the same data as in the preceding slide but with a logarithmic scale on the vertical axis instead of a linear scale. The logarithmic scale allows a better comparison of the proportional changes in the rate of death due to HIV infection with changes in the rates due to other causes of death.

During 1982 through 1998, the rate of death due to HIV infection increased until it became the eighth leading cause of death overall in 1992 through 1995. In 1995, when it was at its peak, HIV infection was reported to be the underlying cause of more than 42,500 deaths. Then the rate fell until HIV infection was the 17th leading cause of death in 1998, when it caused about 13,000 deaths. HIV infection caused 2% of all deaths in 1995, and about 0.6% in 1998.



Trends in the Percentage of Deaths with Selected Infectious Diseases among Persons Dying of HIV Infection, 1987-1997



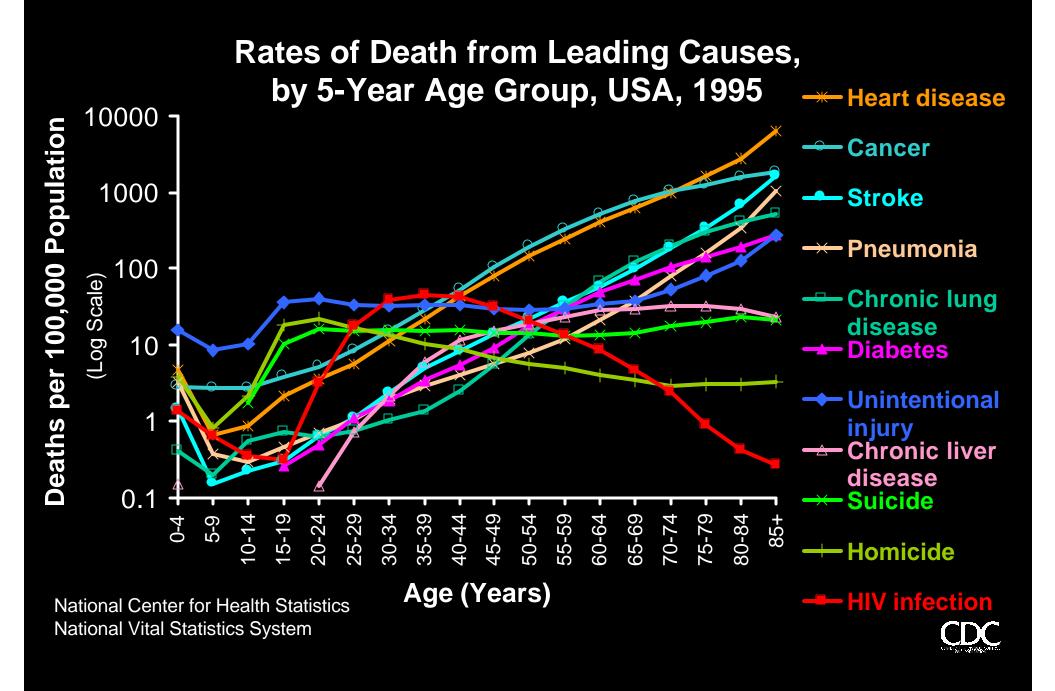
National Vital Statistics System



### Trends in the Percentage of Deaths with Selected Infectious Diseases among Persons Dying of HIV Infection, 1987-1997

The effect of prophylaxis against opportunistic infections is suggested by decreasing trends in the percentage of deaths with various opportunistic infections as secondary or contributory conditions reported among deaths due to underlying HIV infection. The percentage of deaths with pneumocystosis, in particular, decreased from 23% in 1987 to 7% in 1997. Most of these decreases occurred years before the rate of death from HIV infection decreased. These data underestimate the percentage of HIV deaths with various secondary infections because some infections may not be diagnosed. Only about 10% of deaths are investigated by autopsy, which may reveal conditions that would not otherwise be detected.





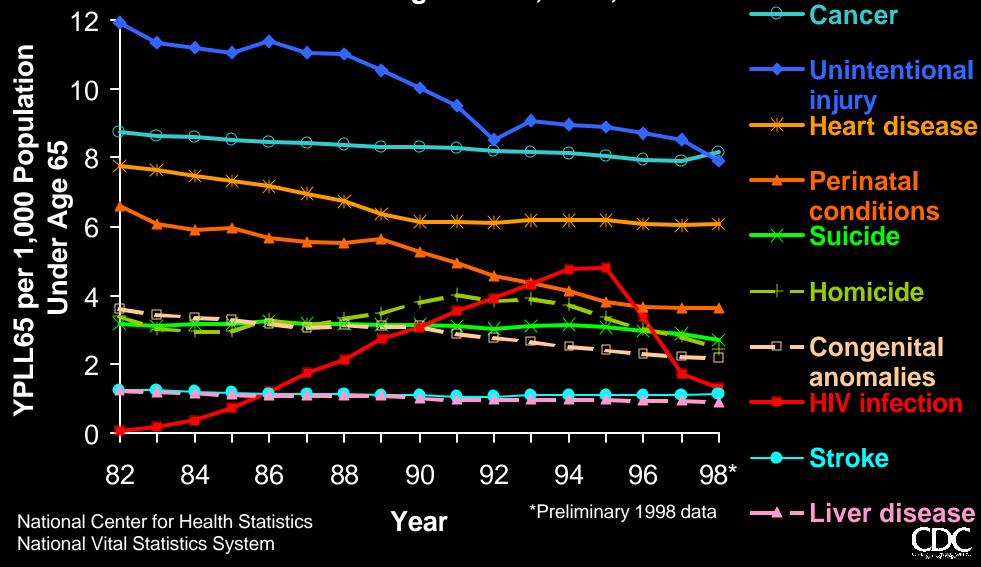
### Rates of Death from Leading Causes, By 5-Year Age Group, USA, 1995

Using a logarithmic scale on the vertical axis, this slide shows age-specific death rates in 1995, when the overall rate of death from HIV infection was at its peak. The HIV death rate is higher in early childhood than in later childhood because of HIV transmission from mother to child around the time of birth. Although the HIV death rate is at a low point at ages 15-19, much HIV transmission may occur among teenagers that does not result in death until several years later. The HIV death rate rises steeply during ages 20-29, reflecting HIV infections acquired through sexual activity and drug abuse in the teenage and early adult years. It reaches a peak of 46 per 100,000 population at ages 35-39 years and thereafter decreases with age. In 1995, unintentional injury was the leading cause of death among persons under 30 years old, but HIV infection was the leading cause of death in age groups 30-34 years and 35-39 years. HIV was the third leading cause of death at ages 40-44 years, following cancer and heart disease.



Trends in Rates of Years of Potential Life Lost Before Age 65 (YPLL65)

Due to Leading Causes, USA, 1982-1998

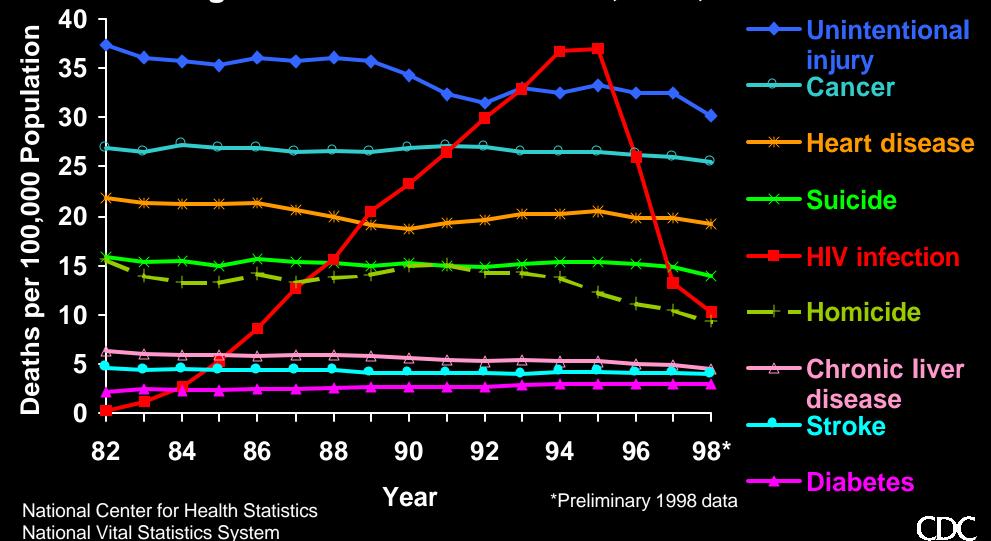


### Trends in Rates of Years of Potential Life Lost Before Age 65 (YPLL65) Due to Leading Causes, USA, 1982-1998

A useful way to compare HIV infection with other causes of death is to measure their impact on premature mortality in terms of years of potential life lost before 65 years of age (YPLL65). The number of YPLL65 for each death under age 65 is equal to 65 minus the age at death. The YPLL65 due to a given cause of death is the sum of the YPLL65 for the individuals who died from that cause. (Deaths at age 65 or older are not included in the calculation.) HIV infection was the fourth leading cause of YPLL65 in 1994 and 1995, when it caused 9% of all YPLL65. It dropped to 8th place in 1998, when it caused about 3% of total YPLL65.



## Trends in Annual Rates of Death from Leading Causes of Death Among Persons 25-44 Years Old, USA, 1982-1998



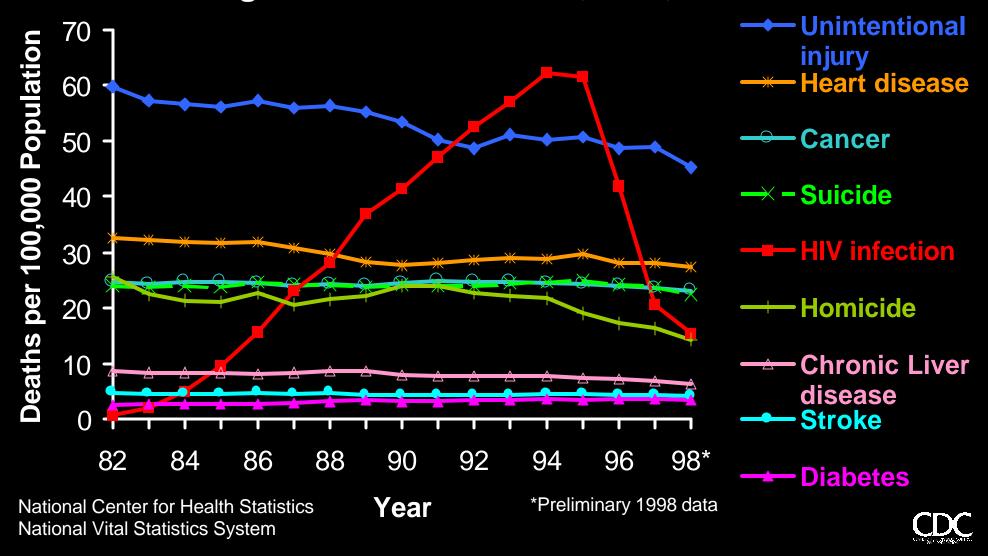
### Trends in Annual Rates of Death from Leading Causes of Death Among Persons 25-44 Years Old, USA, 1982-1998

Focusing on persons 25-44 years old emphasizes the importance of HIV infection among causes of death, because, compared with rates at other ages, the death rate from HIV infection is relatively high in this age group, while death rates from other causes are relatively low. About 70% of all deaths from HIV infection have occurred among persons 25-44 years old.

HIV infection was the leading cause of death among persons 25-44 years old in 1994 and 1995. In 1995, HIV caused almost 31,000 deaths, or 19% of the total in this age group. It then fell to fifth place in 1997 and 1998; it caused about 8,500 deaths, or 7% of the total, in this age group in 1998.



## Trends in Annual Rates of Death from Leading Causes of Death Among Men 25-44 Years Old, USA, 1982-1998

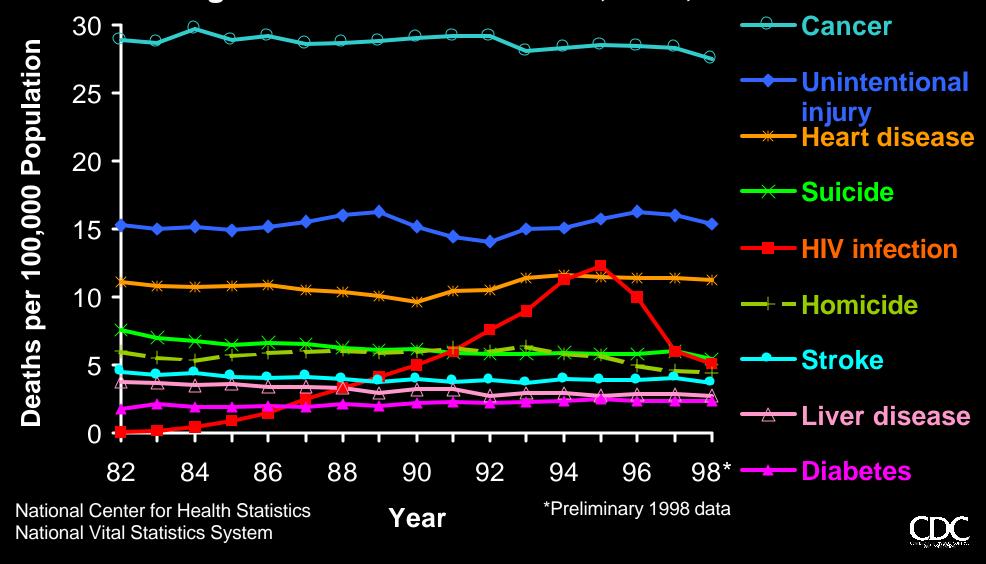


### Trends in Annual Rates of Death from Leading Causes of Death Among Men 25-44 Years Old, USA, 1982-1998

Among men 25-44 years old, HIV infection was the leading cause of death in 1992 through 1995; it caused almost 26,000 deaths, or 23% of the total in this group in 1995. Then the rank of HIV infection fell to fourth place in 1997 and 1998; it caused about 6,000 deaths, or 8% of the total, in this group in 1998.



## Trends in Annual Rates of Death from Leading Causes of Death Among Women 25-44 Years Old, USA, 1982-1998

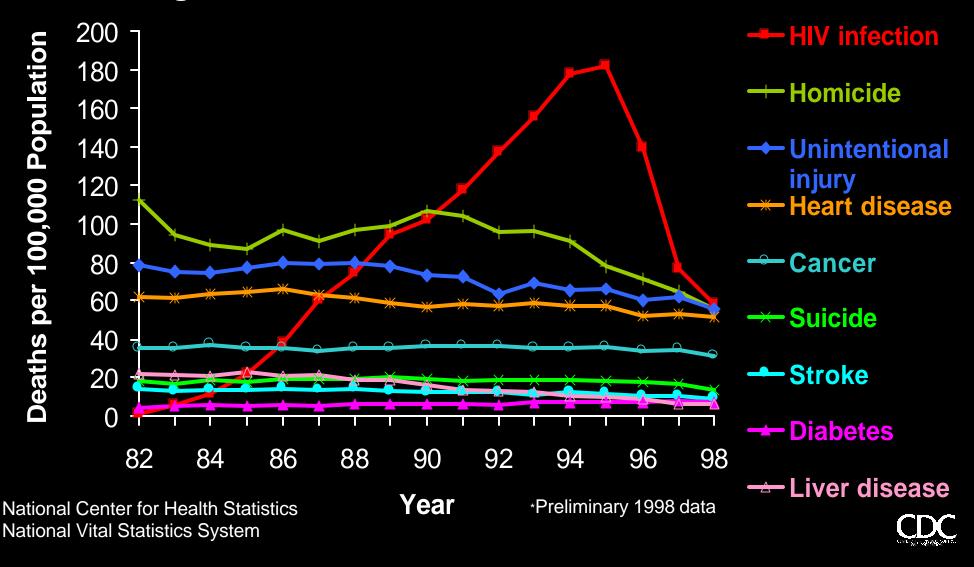


### Trends in Annual Rates of Death from Leading Causes of Death Among Women 25-44 Years Old, USA, 1982-1998

Among women 25-44 years old, HIV infection was the third leading cause of death in 1995, when it caused more than 5,000 deaths, or 11% of the total in this group. Then the rank of HIV infection fell to fifth place in 1998, when it caused about 2,000 deaths, or 5% of the total in this group.



## Trends in Annual Rates of Death from Leading Causes of Death Among Black Men 25-44 Years Old, USA, 1982-1998

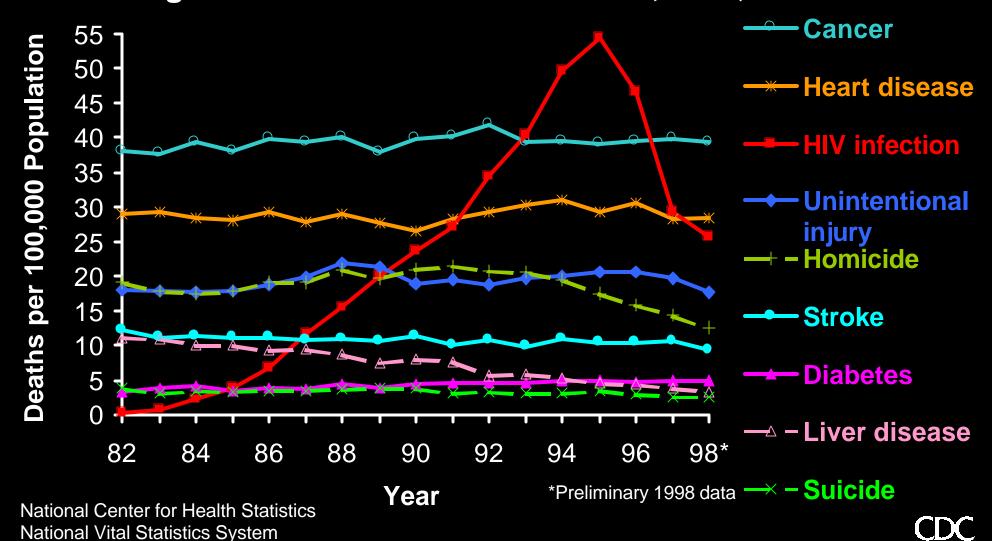


#### Trends in Annual Rates of Death from Leading Causes of Death Among Black Men 25-44 Years Old, USA, 1982-1998

Among black men 25-44 years old, HIV infection has been the leading cause of death since 1991, when it surpassed homicide in the ranking of causes of death. HIV infection caused almost 9,000 deaths, or 32% of all deaths in this group at its peak in 1995, but only about 3,000 deaths, or 16% of the total, in 1998.



## Trends in Annual Rates of Death from Leading Causes of Death Among Black Women 25-44 Years Old, USA, 1982-1998

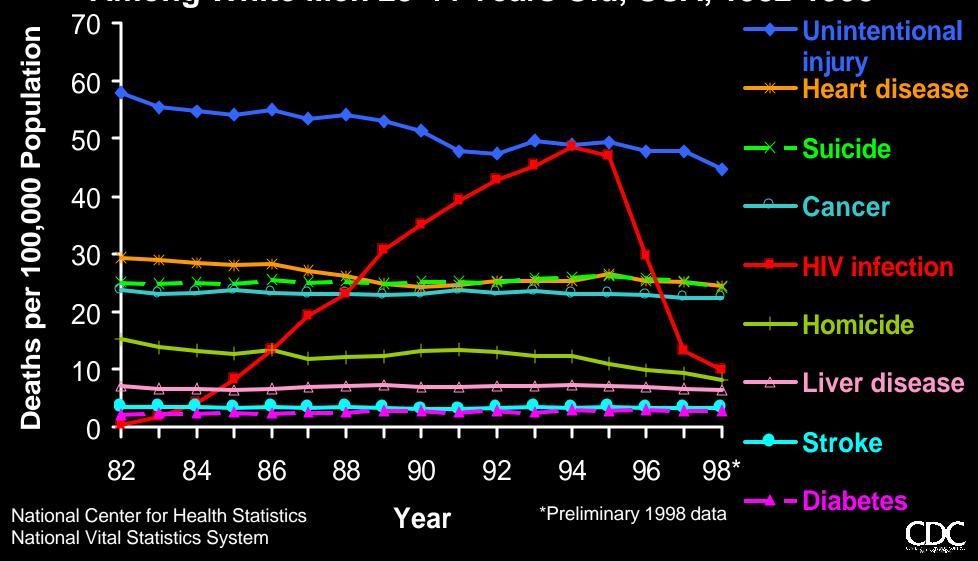


#### Trends in Annual Rates of Death from Leading Causes of Death Among Black Women 25-44 Years Old, USA, 1982-1998

Among black women 25-44 years old, HIV infection was the leading cause of death from 1993 through 1996, and then fell to third place, after cancer and heart disease, in 1998. HIV infection caused more than 3,000 deaths, or 22% of all deaths in this group in 1995, and about 1,500 deaths, or 13% of the total, in 1998.



## Trends in Annual Rates of Death from Leading Causes of Death Among White Men 25-44 Years Old, USA, 1982-1998

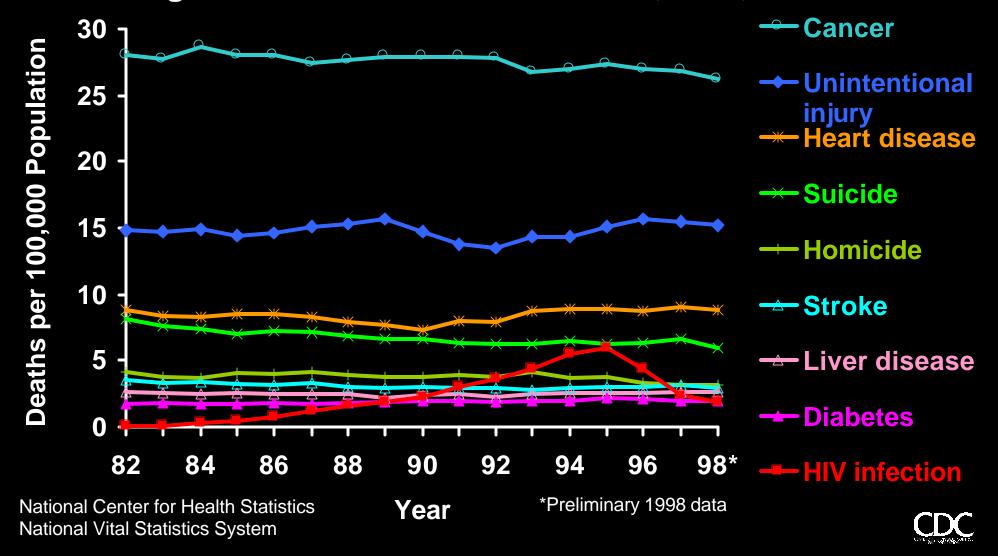


### Trends in Annual Rates of Death from Leading Causes of Death Among White Men 25-44 Years Old, USA, 1982-1998

Among white men 25-44 years old, HIV infection was the second leading cause of death, after unintentional injury, from 1989 through 1996, and then dropped below heart disease, suicide, and cancer in 1997 and 1998. HIV infection caused almost 17,000 deaths, or 21% of the total in this group, at its peak in 1994, and about 3,000, or 5%, in 1998.



# Trends in Annual Rates of Death from Leading Causes of Death Among White Women 25-44 Years Old, USA, 1982-1998

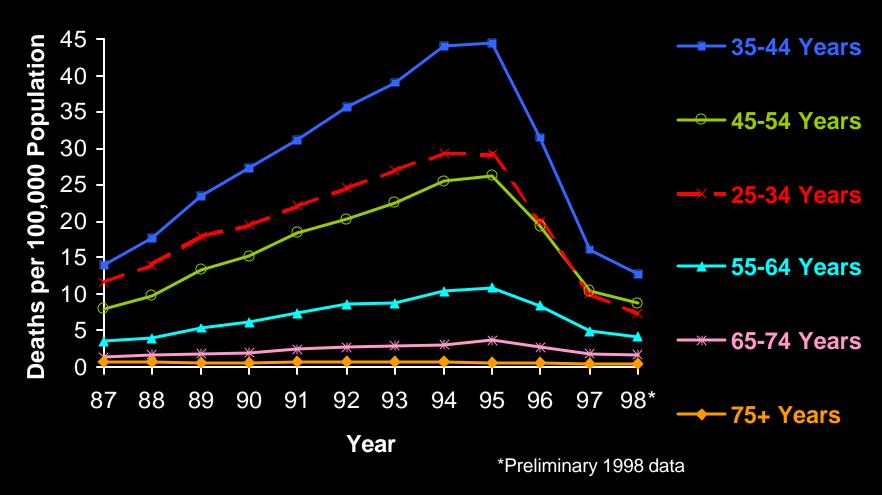


#### Trends in Annual Rates of Death from Leading Causes of Death Among White Women 25-44 Years Old, USA, 1982-1998

Among white women 25-44 years old, HIV infection was the fifth leading cause of death at its peak rate in 1995, when it caused about 1,300 deaths, or 4% of the total in this group. It fell to ninth place in 1998, when it caused about 600 deaths, or 2% of the total.



# Trends in Annual Rates of Death from HIV Infection By Age Group, USA, 1982-1998



National Center for Health Statistics National Vital Statistics System

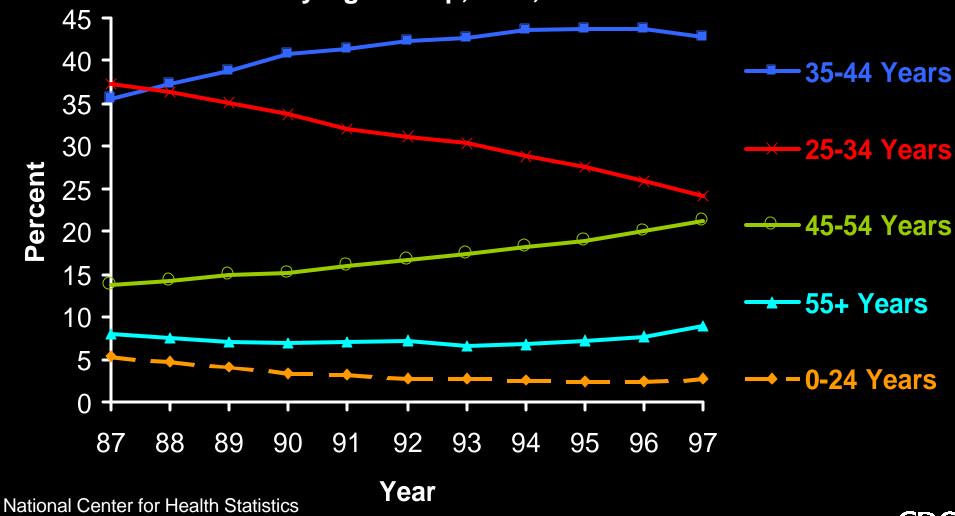


#### Trends in Annual Rates of Death from HIV Infection By Age Group, USA, 1982-1998

Among persons 25 years old or older, the percentage decrease in the rate of death from HIV infection from 1995 to 1998 was inversely correlated with age. It dropped from 75% among persons 25 to 34 years old to 66% among persons 45 to 54 years old, and only 30% among those 75 years or older.



### Trends in the Percentage Distribution of Deaths from HIV Infection, By Age Group, USA, 1987-1997



National Center for Health Statistics National Vital Statistics System

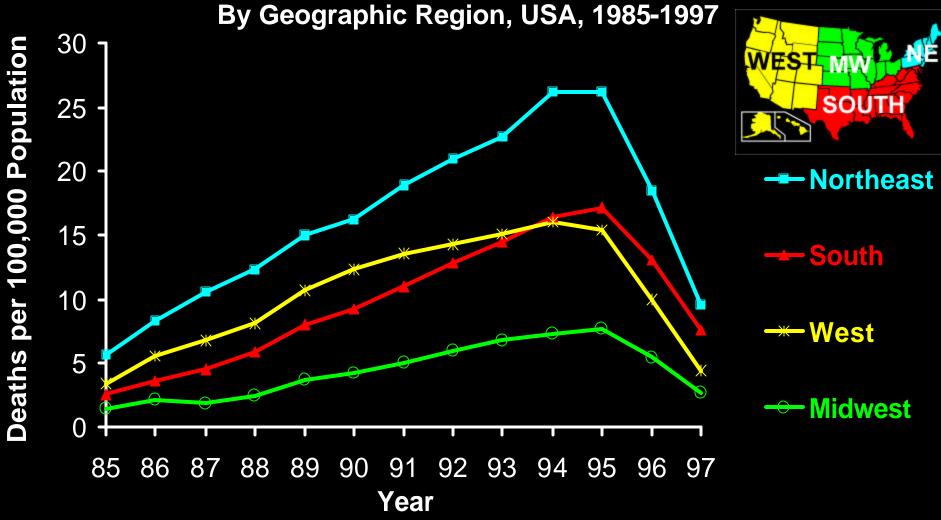


### Trends in the Percentage Distribution of Deaths from HIV Infection, By Age Group, USA, 1987-1997

Between 1987 and 1997, the percentage of deaths from HIV infection that occurred at ages under 35 years decreased, while the percentage at older ages increased. The median age at death from HIV infection increased from 36 years to 40 years during this period. One reason for these changes may be longer survival of HIV-infected persons, allowing them to reach older ages before they die.



Trends in Age-Adjusted\* Annual Rates of Death from HIV Infection,



\*Using the age distribution of the projected year 2000 U.S. population as the standard

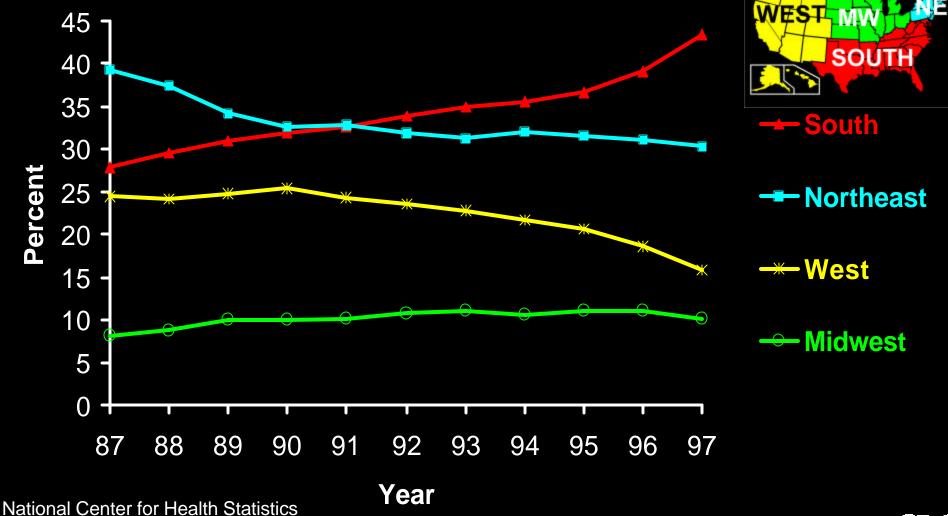


### Trends in Age-Adjusted Annual Rates of Death from HIV Infection, By Geographic Region, USA, 1985-1997

Among the four regions of the United States, the rate of death from HIV infection increased fastest in the South and slowest in the West. From 1989 to 1995, the age-adjusted rate increased 111% in the South, 103% in the Midwest, 73% in the Northeast, and 43% in the West. The rate in the South surpassed the rate in the West in 1996. After 1995, the rate decreased fastest in the West and slowest in the South. From 1995 to 1997, the rate decreased 71% in the West, about 65% in both the Midwest and Northeast, and 56% in the South.



Trends in the Percentage Distribution of Deaths from HIV Infection, By Geographic Region, USA, 1987-1997



National Center for Health Statistics National Vital Statistics System

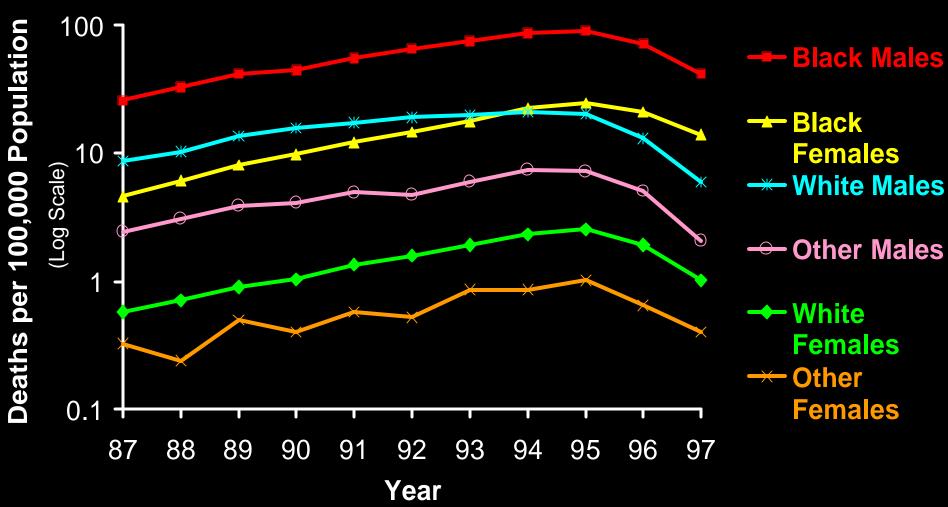


#### Trends in the Percentage Distribution of Deaths from HIV Infection, By Geographic Region, USA, 1987-1997

Between 1987 and 1997, the percentage of deaths from HIV infection that were among residents of the South increased from 28% to 44%, while the percentage in the Northeast decreased from 39% to 30% and the percentage in the West decreased from 24% to 16%.



# Trends in Age-Adjusted\* Annual Rates of Death from HIV Infection, By Sex and Race, USA, 1987-1997



\*Using the age distribution of the projected year 2000 U.S. population as the standard



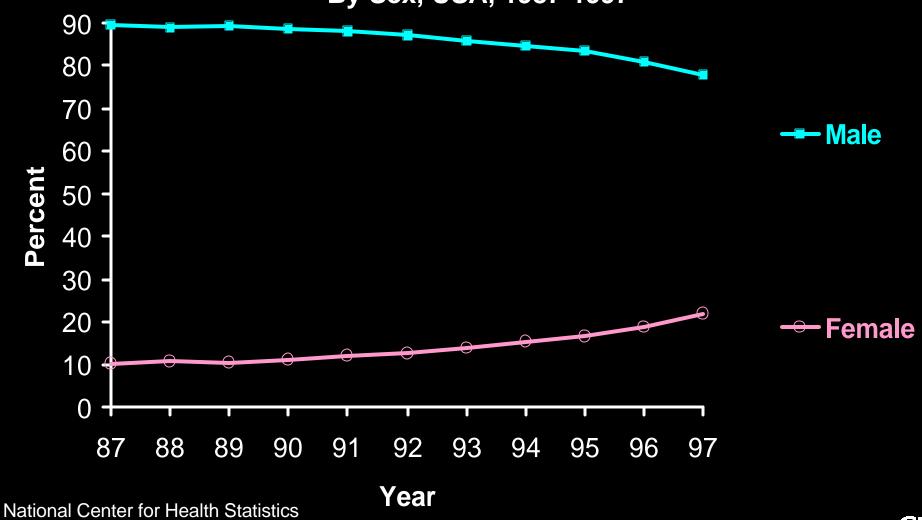
#### Trends in Age-Adjusted Annual Rates of Death from HIV Infection, By Sex and Race, USA, 1987-1997

Among different sex and racial groups, from 1987 to 1995, the age-adjusted rate of death from HIV infection increased fastest among black females and slowest among white males. As a result, the rate among black females surpassed the rate among white males in 1995. The percentage increase in the rate during that period was 425% for black females, 339% for white females, 239% for black males, 212% for other females (including Asians, Pacific Islanders, American Indians, and Alaska Natives), 198% for other males, and 133% for white males.

From 1995 to 1997, the rate decreased fastest among males of white and other races and slowest among black females. The percentage decrease in the rate was 71% among white and other males, 60% among white and other females, 54% among black males, and 44% among black females. These differences in percentage changes may be due to differences in access to treatment, the quality of treatment, or social factors that affect treatment acceptance or adherence. Because of the differences in proportional changes in the death rates, the ratios between the rates among different groups changed. For example, between 1987 and 1997, the ratio of the rate among black males to the rate among white males increased from 3 to 7, while the ratio of the rate among black females to the rate among white females increased from 8 to 13. Persons of Hispanic ethnicity are included in the racial groups shown in this slide, mostly among persons of white race.







National Center for Health Statistics National Vital Statistics System

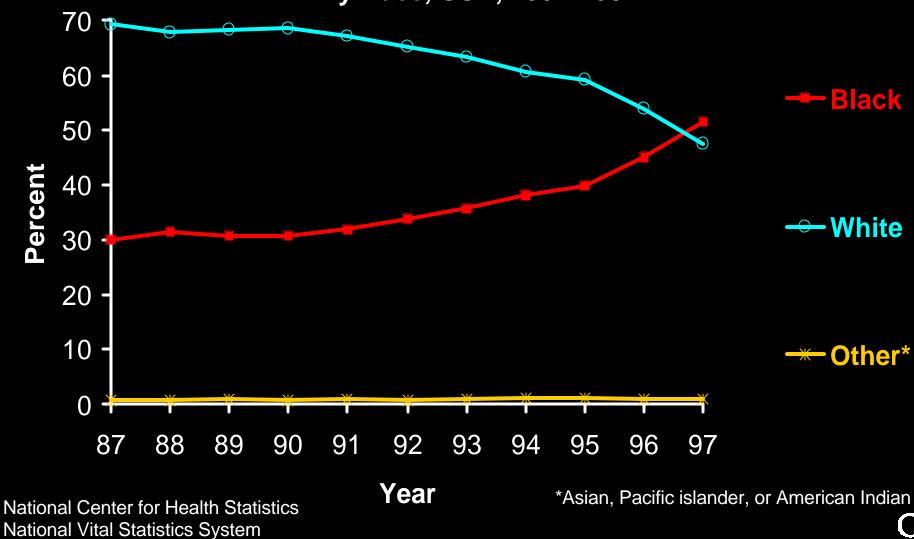


#### Trends in the Percentage Distribution of Deaths from HIV Infection, By Sex, USA, 1987-1997

Between 1987 and 1997, the percentage of females among persons who died from HIV infection increased from 10% to 22%, while the percentage of males decreased from 90% to 78%.



## Trends in the Percentage Distribution of Deaths from HIV Infection, By Race, USA, 1987-1997

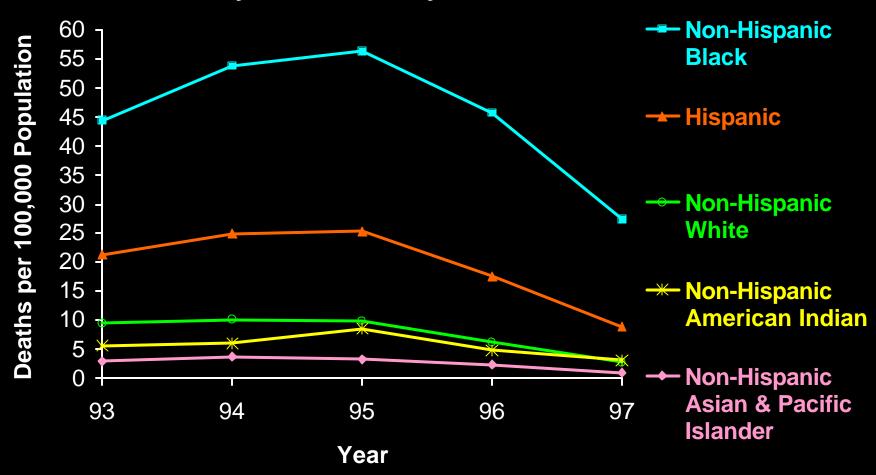


#### Trends in the Percentage Distribution of Deaths from HIV Infection, By Race, USA, 1987-1997

Between 1987 and 1997, the percentage of blacks among persons who died from HIV infection increased from 30% to 52%, while the percentage of whites decreased from 69% to 47%. Other races, including Asians, Pacific Islanders, and American Indians, have constituted 1% or less of persons who died from HIV infection in all years. Persons of Hispanic ethnicity are included in the racial groups shown in this slide, mostly among whites.



### Trends in Age-Adjusted\* Annual Rates of Death from HIV Infection By Race/Ethnicity, USA\*\*, 1993-1997



<sup>\*</sup>Using the age distribution of the projected year 2000 US population as the standard.

<sup>\*\*</sup>Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997.



#### Trends in Age-Adjusted Annual Rates of Death from HIV Infection By Race/Ethnicity, USA, 1993-1997

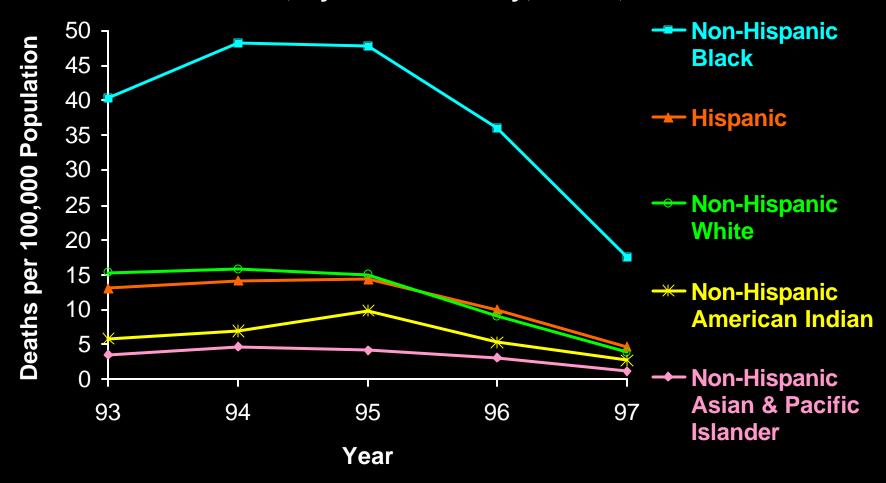
Death certificate data on Hispanics have not been available for the entire nation until 1997. The number of states that recorded Hispanic ethnicity on death certificates increased gradually. From 1993 through 1996, Oklahoma was the only state that did not record ethnicity, so data from Oklahoma are not included in this graph.

Nationally, the rate of death due to HIV infection among Hispanics has been intermediate between the rates among non-Hispanic blacks and non-Hispanic whites.

The percentage decrease in the age-adjusted rate from 1995 to 1997 was greatest among non-Hispanic whites and Asians and Pacific islanders, at 72% and 71%, respectively, and least among non-Hispanic blacks, at 51%. It was intermediate among Hispanics and American Indians, at 65% and 64%, respectively.



### Trends in Age-Adjusted\* Annual Rates of Death from HIV Infection in the West, By Race/Ethnicity, USA\*\*, 1993-1997



<sup>\*</sup>Using the age distribution of the projected year 2000 US population as the standard.

<sup>\*\*</sup>Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997.

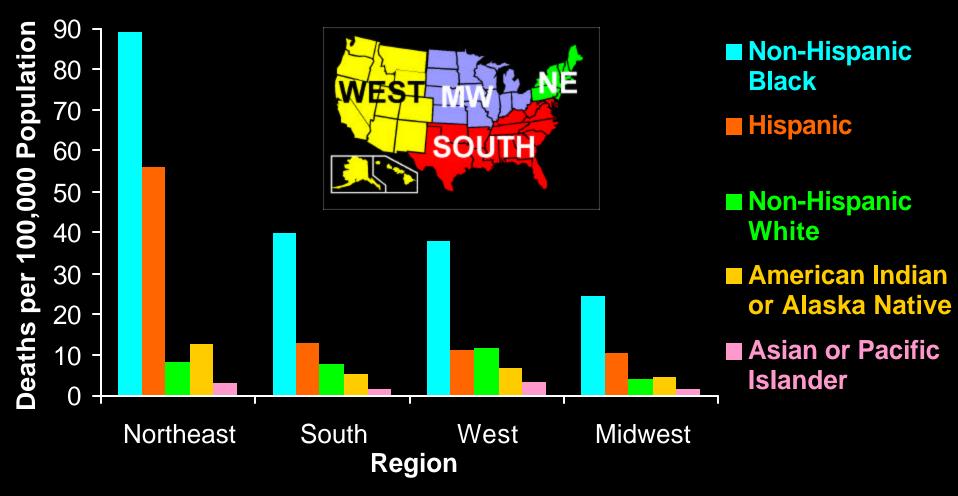


#### Trends in Age-Adjusted Annual Rates of Death from HIV Infection in the West, By Race/Ethnicity, USA, 1993-1997

In the West, unlike the other three regions of the country, the rate of death from HIV infection among Hispanics was almost the same as it was among non-Hispanic whites. The rate among non-Hispanic whites was at first higher than the rate among Hispanics, but it fell below the rate among Hispanics after 1995.



## Age-adjusted\* Mean Rate of Death from HIV Infection during 1993-1997, By Race / Ethnicity and Geographic Region, USA



<sup>\*</sup>Adjusted to the age distribution of the projected year 2000 U.S. population National Center for Health Statistics, National Vital Statistics System

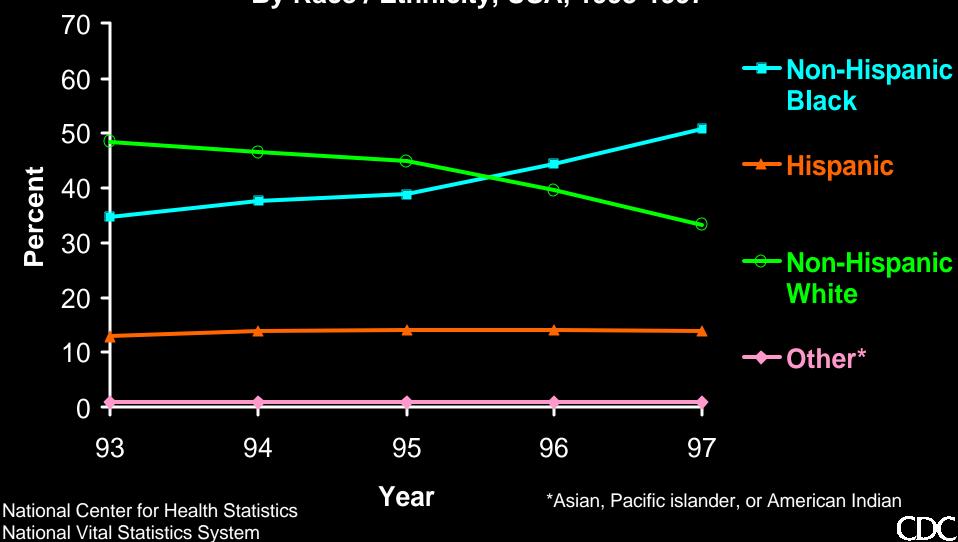


#### Age-adjusted Mean Rate of Death from HIV Infection during 1993-1997, By Race / Ethnicity and Geographic Region, USA

The mean rates of death from HIV infection over the years 1993-1997 were calculated by combining the data for that 5-year period. The rates among non-Hispanic blacks and Hispanics were much higher in the Northeast than in the other three regions, and were much higher there than the rates among non-Hispanic whites, Asians, and American Indians. The rate among non-Hispanic whites was highest in the West, and was slightly higher there than the rate among Hispanics.



# Trends in the Percentage Distribution of Deaths from HIV Infection, By Race / Ethnicity, USA, 1993-1997

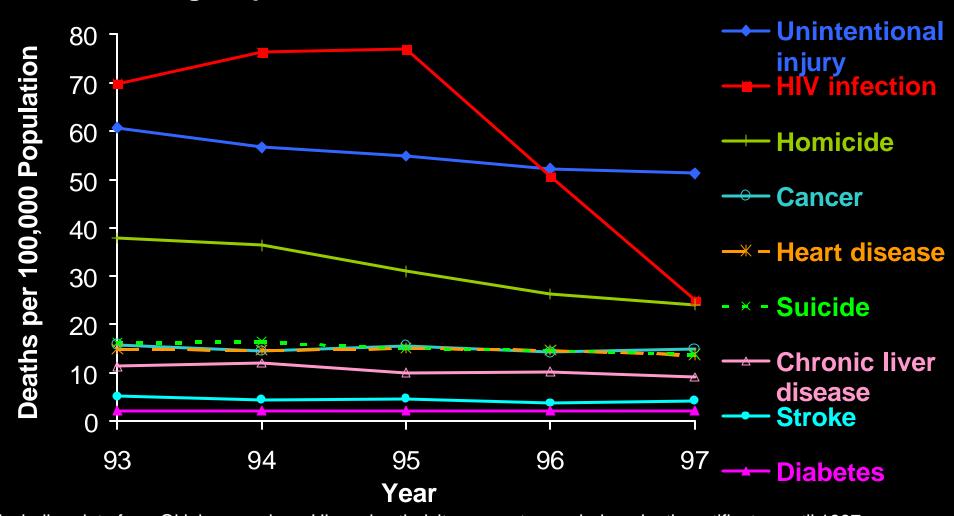


#### Trends in the Percentage Distribution of Deaths from HIV Infection, By Race / Ethnicity, USA, 1993-1997

Between 1993 and 1997, the percentage of non-Hispanic blacks among persons who died from HIV infection increased from 35% to 51%, while the percentage of non-Hispanic whites decreased from 48% to 33%. The percentages of Hispanics and other racial/ethnic groups, including non-Hispanic Asians, Pacific islanders, and American Indians, were relatively stable at 13% to 14% and 1%, respectively.



### Trends in Annual Rates of Death from the 9 Leading Causes of Death Among Hispanic Men 25-44 Years Old, USA\*, 1993-1997



\*Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997 National Center for Health Statistics, National Vital Statistics System

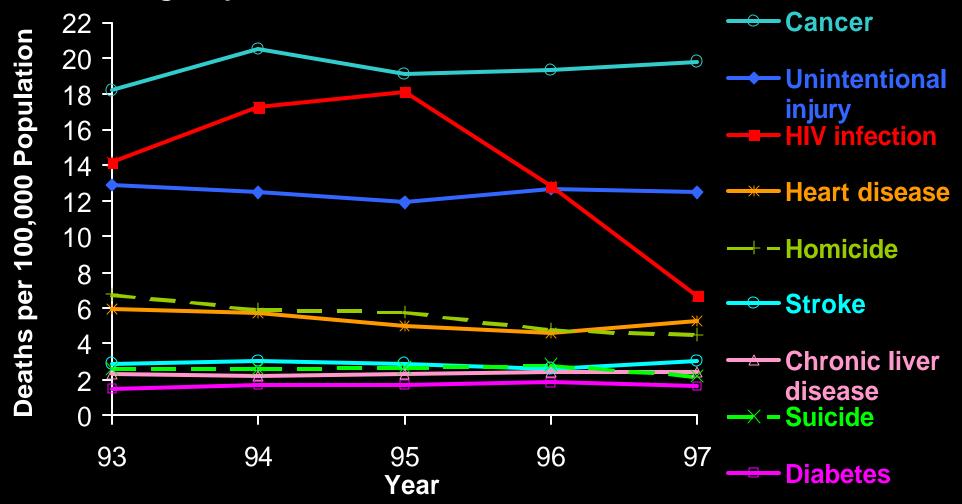


#### Trends in Annual Rates of Death from the 9 Leading Causes of Death Among Hispanic Men 25-44 Years Old, USA, 1993-1997

Among Hispanic men 25-44 years old, HIV infection was the leading cause of death from 1993 through 1995, causing 29% of deaths in this group in 1995. Then HIV infection fell to second place in 1996 and 1997, after unintentional injury, causing 13% of deaths in this group in 1997.



### Trends in Annual Rates of Death from the 9 Leading Causes of Death Among Hispanic Women 25-44 Years Old, USA\*, 1993-1997



<sup>\*</sup>Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997. National Center for Health Statistics, National Vital Statistics System

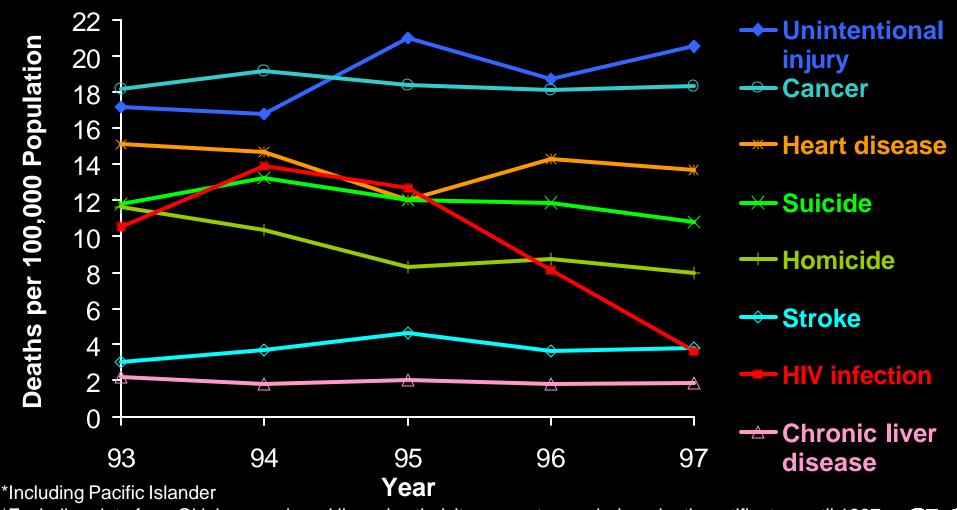


#### Trends in Annual Rates of Death from the 9 Leading Causes of Death Among Hispanic Women 25-44 Years Old, USA, 1993-1997

Among Hispanic women 25-44 years old, HIV infection was the second leading cause of death, after cancer, from 1993 through 1996, and then fell to third place, after cancer and unintentional injury, in 1997. HIV infection caused 20% of deaths in this group in 1995, but only 9% in 1997.



### Trends in Annual Rates of Death from the 8 Leading Causes of Death Among Non-Hispanic Asian\* Men 25-44 Years Old, USA<sup>H</sup>, 1993-1997



†Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997.

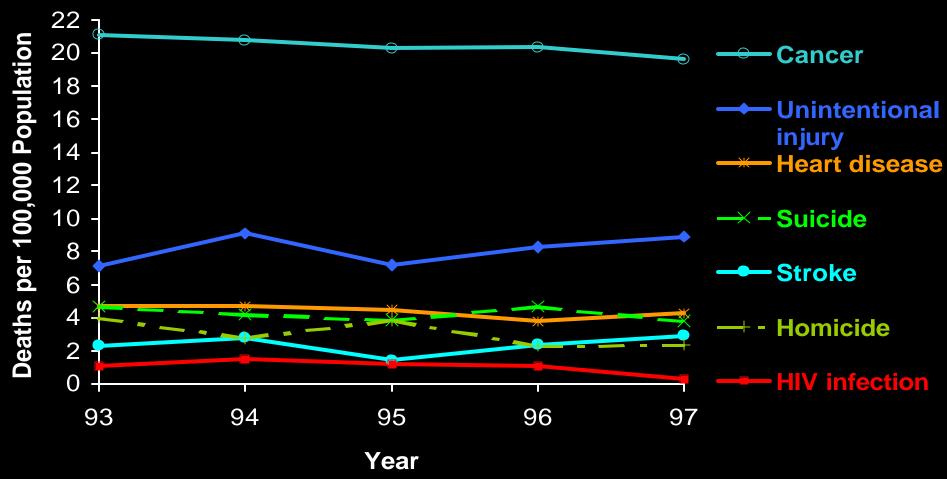


Trends in Annual Rates of Death from the 8 Leading Causes of Death Among Non-Hispanic Asian Men 25-44 Years Old, USA, 1993-1997

Among non-Hispanic Asian and Pacific Islander men 25-44 years old, HIV infection was the third leading cause of death in 1995, after unintentional injury and cancer. Then it fell to seventh place in 1997. HIV infection caused 12% of deaths in this group in 1995, but only 4% in 1997.



### Trends in Rates of Death from the 6 Leading Causes of Death and HIV Infection Among Non-Hispanic Asian\* Women 25-44 Years Old, USA<sup>H</sup>, 1993-1997



<sup>\*</sup>Including Pacific Islander

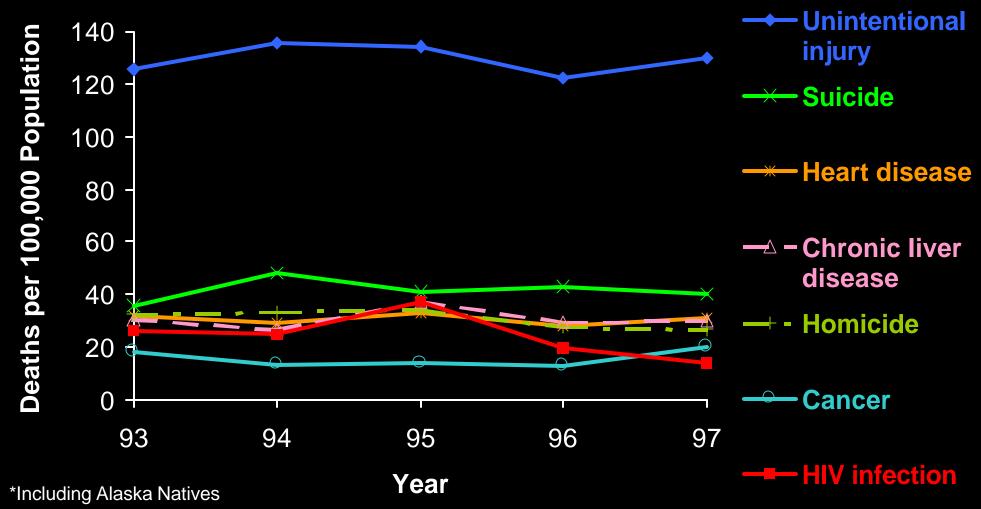
<sup>†</sup>Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997.

Trends in Rates of Death from the 6 Leading Causes of Death and HIV Infection Among Non-Hispanic Asian Women 25-44 Years Old, USA, 1993-1997

Among non-Hispanic Asian and Pacific Islander women 25-44 years old, HIV infection was the seventh leading cause of death from 1993 through 1996, and then fell to 14th place in 1997. At its peak, in 1994, HIV infection caused 3% of deaths in this group; in 1997, it caused less than 1%. Because of the small numbers of deaths from HIV infection, the estimates of death rates due to HIV infection in this group are not very reliable.



## Trends in Annual Rates of Death from the 7 Leading Causes of Death Among Non-Hispanic American Indian\* Men 25-44 Years Old, USA<sup>H</sup>, 1993-1997



†Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997.

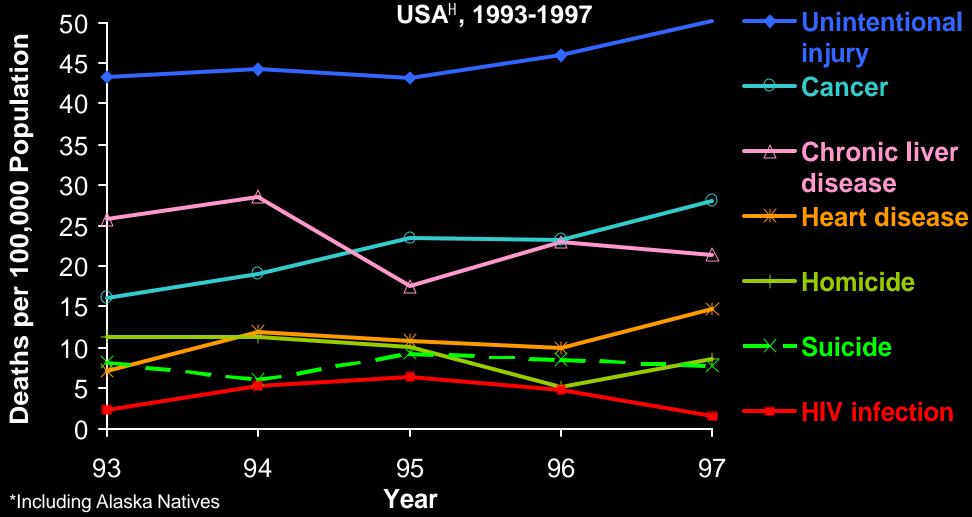


Trends in Annual Rates of Death from the 7 Leading Causes of Death Among Non-Hispanic American Indian Men 25-44 Years Old, USA,1993-1997

Among non-Hispanic American Indian and Alaska Native men 25-44 years old, HIV infection was the third leading cause of death in 1995, after unintentional injury and suicide. Then it fell to seventh place in 1997. HIV infection caused 9% of deaths in this group in 1995, and 4% in 1997.



Trends in Annual Rates of Death from the 6 Leading Causes of Death and HIV Infection Among Non-Hispanic American Indian\* Women 25-44 Years Old,



†Excluding data from Oklahoma, where Hispanic ethnicity was not recorded on death certificates until 1997.



Trends in Annual Rates of Death from the 6 Leading Causes of Death and HIV Infection Among Non-Hispanic American Indian Women 25-44 Years Old, USA

Among non-Hispanic American Indian and Alaska Native women 25-44 years old, HIV infection was the seventh leading cause of death from 1994 through 1996, and then fell to 10th place in 1997. HIV infection caused 4% of deaths in this group in 1995, and less than 1% in 1997. Because of the small numbers of deaths from HIV infection, suicide, and homicide, the estimates of death rates due to those causes in this group are not very reliable.



#### **Major Conclusions:**

- After rapidly increasing since the 1980s, the annual rate of death due to HIV infection leveled between 1994 and 1995, and then decreased rapidly through 1998.
- HIV infection remains a leading cause of death among persons 25-44 years old, particularly for blacks and Hispanics.
- Persons dying from HIV infection increasingly consist of females, blacks (>50% since 1997), and residents of the South.

